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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/605,657

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Mandeep Singh

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7590

03/13/2003

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EXAMINER

NGUYEN, HUNG

ART UNIT

PAPER NUMBER

2851

DATE MAILED: 03/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/605,657

Applicant(s)

SINGH ET AL.

Examiner

Hung Henry V Nguyen

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 February 2003.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8, 10 and 14-44 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 41-44 is/are allowed.
- 6) ☒ Claim(s) 1-8, 10 and 14-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 June 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_                      6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 20, 22-40 are rejected under 35 U.S.C. 103(a) as being unpatentable Mori et al (U.S.Pat. 6,268,904) in view of Montcalm et al (U.S.Pat. 5,958,605).

With regard to claims 20, 22-40, Mori et al discloses a projection optical system comprising substantially all basic features of the instant claims such as: an illumination optical systems (10-30) for supplying a projection beam of radiation; a reticle stage for holding a reticle (20); a wafer stage (23) for holding a wafer (22); a projection optical system (21) for projecting a predetermined pattern formed on the mask onto the wafer (see fig.1). Mori does not expressly disclose at least one of the optical elements in the illumination optical system or in the projection optical system such as a sensor or a lens or a reflector having a surface which is coated by a "relatively inert material" capping layer. Montcalm et al discloses an extreme ultraviolet projection lithography apparatus having optical elements with a "relatively inert material" reflective capping layers deposited for the purpose of preventing oxidation and corrosion thereby improving the EUV optical performance" (see col.1, lines 20 thru col.2, line 24). Montcalm et al further teaches the inert materials including "molybdenum-silicon, molybdenum carbide-silicon, molybdenum-beryllium and molybdenum carbide-beryllium or carbon and palladium, or compound material, such as carbides, borides, nitrides and oxides.

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“Specific examples include molybdenum carbide, boron carbide, ...boron nitride, ....and silicon oxide (see col.2, lines 4-24) and the thickness of the layer is in the range of 0.5 to 5nm and the wavelength range of the projection beam is from 11.2 to 12nm (see col.2, lines 25-36). This provides a concrete evidence that it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Mori et al and Montcalm to obtain the invention as claimed. It would have been obvious to a skilled artisan to provide optical elements such as a sensor or reflector with protective capping layer consisting of “diamond like carbon, boron nitride, boron carbide, silicon nitride, silicon carbide, B, Pd, Ru, Rh, Au,  $\text{MaF}_2$ , LiF,  $\text{C}_2\text{F}_4$ , TiN, and compounds and alloys thereof” into the exposure apparatus of Mori for the purpose of preventing “oxidation and corrosion thereby improving the EUV optical performance” as suggested by Montcalm.

In addition, it has been held that where general condition of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Also, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

3. Claims 1-8, 10, 14-19, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over unpatentable Mori et al (U.S.Pat. 6,268,904) in view of Montcalm et al (U.S.Pat. 5,958,605) and further in view of Early et al (U.S.Pat. 5,356,662).

With respect to claims 1-8, 14-19 and 21, Mori et al as modified by Montcalm discloses substantially all limitations of the claim as discussed except for the inert material being selected

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from the group consisting of diamond-like carbon (C), Ru, Rh, Au, MgF<sub>2</sub>, LiF, C<sub>2</sub>F<sub>4</sub>, TiN and compounds and alloys thereof'. Early et al teaches an optical element which is coated by an inert material such as rhodium(Rh), ruthenium (Ru). It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Mori, Montcalm and Early to obtain the invention as specified in the instant claims. It would have been obvious to a skilled artisan to select a capping layer of inert material such as rhodium, or ruthenium as suggested by Early for covering the surface of at least one the illumination system and projection system of the exposure device of Mori et al as modified by Montcalm. As clearly suggested by Montcalm, the purpose of doing so would have been to prevent oxidation and corrosion thereby improving the EUV optical performance.

4. Claims 1-8, 10, 14-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi et al (U.S.Pat. 6,414,743).

With respect to claims 1-8, 10, 14-40, Nishi et al discloses an exposure apparatus for transferring a predetermined pattern formed on a reticle (R) onto a substrate (W) comprising: an illumination system (see fig.1) for supplying a projection beam of radiation; a first object table provided with a first object holder (30, 34, 35) for holding a reticle; a second object table provided with a second object holder (42, 43) for holding the substrate; a projection (PL) which is constructed and arranged to utilize the radiation to image on irradiated portion of the reticle onto a target portion on the substrate. Nishi et al does not expressly disclose "at least one of the illumination system and projection system having an optical element with a surface on which radiation is incident and a capping layer covering said surface, said capping layer being formed of a relatively inert material, wherein said relative material is selected from the group consisting

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of : diamond-like carbon (C), Ru, Rh, Au, MgF<sub>2</sub>, LiF, C<sub>2</sub>F<sub>4</sub>, TiN and compounds and alloys thereof'. However, Nishi et al teaches optical elements in the exposure apparatus can be made of optical glass materials such as magnesium fluoride (MgF<sub>2</sub>), lithium fluoride (LiF) and so on ( see col.2, lines 25-27). In view of such teachings, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Nishi et al to obtain the invention as claimed. It would have been obvious to a skilled artisan to provide optical elements (such as a lens, a mirror, a sensor or reflector) with protective capping layer selecting from the group consisting of "diamond like carbon, Ru, Rh, Au, MgF<sub>2</sub>, LiF, C<sub>2</sub>F<sub>4</sub>TiN, and compounds and alloys thereof" into the exposure apparatus of Nishi for the purpose of preventing "oxidation and corrosion thereby improving the EUV optical performance".

In addition, it has been held that where general condition of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Also, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

***Prior Art Made of Record***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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Ohmi (U.S.Pat. 5,981,075) teaches optical articles and devices where materials for optically transparent thin layers for constituting the optical thin film are selected from group of aluminum oxide, lithium fluoride, and so on (see col.6, lines 19-35).

Smith (U.S.Pat. 6,395,433) teaches photo mask for projection lithography where the photo mask can be made of materials selected from a group consisting of Ru, Mn, Cu (see claim 6 for example)

***Response to Amendment***

6. Applicant's amendments filed January 17, 2002 and Supplemental amendment filed February 6, 2003 have been entered.

In response to the office action, applicant has amended independent claims 1 and 15 that deleted the material of Boron (B) and has amended dependent claim 21 that deleted the materials of boron nitride, boron carbide, silicon nitride and silicon carbide. Then applicant argues that neither Mori et al nor Montcalm et al, taken alone or in combination, discloses the subject matters as now recited in claims 1, 15 and 21. Applicant's arguments have been carefully considered but have been traversed in view of new ground rejections as set forth above.

Turning to claim 20, applicant argues that Montcalm et al teaches having optical elements with a "relatively inert material" reflective capping layers deposited for the purpose of preventing oxidation and corrosion thereby improving the EUV optical performance" but Montcalm is silent about providing a sensor with a surface covered with a capping layer formed by a relatively inert material. The applicant defined that "a sensor is any device that receives a signal or stimulus (as heat or pressure or light or motion etc.) and responds to the signal or stimulus (syn:detector, sensing elements) and then the applicant discussed two categories of a

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sensor based on his interpretation. The Examiner respectfully disagrees with the applicant since this has nothing to do with the claimed invention. One having basic skill in the art would understand that in lithography, "a sensor" can also be used for sensing a variation in the attenuation factor (for example, variation in light transmittance from a light source) and many types of sensors such as image sensor or spot sensor or radiation sensor can be used in an extreme ultraviolet lithography and they are also suffered from oxidation and corrosion as recognized by Montclam. Also, the applicant is reminded that the rejection here is made under 35 U.S.C. 103. There need not necessarily be a clear suggestion that the optical element as suggested by Montcalm must be a sensor. The issue here is whether one of ordinary skill in the art in the possession of Mori et al and Montcalm would modified their teachings to come up with applicant's invention. As clearly suggested in the reference of Montcalm, the multiplayer reflecting coatings with inert material is used for optical elements in extremely ultraviolet lithography and it is the Examiner's position that the optical element as suggested by Montcalm, can be regarded as "a sensor" in the broadest sense. The person having ordinary skill in the art is usually a graduate engineer. The examiner fails to find applicant's arguments convincing that the claimed invention would have been unobvious to a such person.

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after



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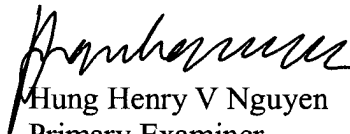
the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

*Allowable Subject Matter*

8. Claims 41-44 are allowed with the reasons as set forth in the previous office action.
9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung Henry V Nguyen whose telephone number is 703-305-6462. The examiner can normally be reached on Monday-Friday (First Friday off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Russ Adams can be reached on 703-308-2847.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4900.

  
Hung Henry V Nguyen  
Primary Examiner  
Art Unit 2851

hvn  
March 8, 2003